PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project **Rehabilitate instream and riparian habitat on the Similkameen and Okanogan Rivers.**	
BPA project number	**20033**
Contract renewal date (mm/yyyy)	**n/a**
Multiple actions? (indicate Yes or No)	**Yes**
Business name of agency, institution or organization requesting funding **U.S. Fish and Wildlife Service**	
Business acronym (if appropriate)	**USFWS**
Proposal contact person or principal investigator:	
Name **Mailing address** **City, ST Zip** **Phone** **Fax** **Email address**	**Kate Terrell** **517 S. Buchanan Street** **Moses Lake, WA 98837** **(509) 765-6125** **(509) 765-9043** **Kate_Terrell@fws.gov**
NPPC Program Measure Number(s) which this project addresses 7.6, 7.7, 7.9, and 7.10	
FWS/NMFS Biological Opinion Number(s) which this project addresses West Coast Steelhead Briefing Package, Steelhead Conservation Efforts: A Supplemental to the Notice of Determination for West Coast Steelhead Under the Endangered Species Act.	
Other planning document references Toats Coulee Watershed Analysis, Draft: Okanogan River Basin Watershed Plan, Washington State Salmonid Stock Inventory: Bull trout/Dolly Varden, 1992 Washington State Salmon and Steelhead Stock Inventory, Conservation Assessment for Inland Cutthroat Trout, Draft Mid-Columbia Tributary Compensation Plan, Steelhead Conservation Efforts: A Supplement to the Notice of Determination for West Coast Steelhead Under the Endangered Species Act, and Tonasket Watershed Assessment	
Short description Rehabilitate and enhance 6 miles of in-stream and riparian habitat along the Okanogan and Similkameen river channels adjacent to Driscoll Island. This will enhance spawning habitat for adult anadromous salmonids and improve the rearing and resting habitat for juveniles. Habitat improvements may result in increased production and survivability of juveniles. Improvements along the riparian buffer will also benefit wildlife species.	
Target species Species that will be affected include chinook (*Oncorhynchus tshawytscha)*, steelhead (*Oncorhynchus mykiss)*, and sockeye (*Oncorhynchus nerka)* salmon as well as resident species.	

Section 2. Sorting and evaluation

Subbasin Okanogan River Watershed

Evaluation Process Sort

CBFWA caucus		CBFWA eval. process		ISRP project type	
X one or more caucus		If your project fits either of these processes, X one or both		X one or more categories	
X	Anadromous fish	X	Multi-year (milestone-based evaluation)	X	Watershed councils/model watersheds
X	Resident Fish		Watershed project eval.		Information dissemination
X	Wildlife				Operation & maintenance
					New construction
					Research & monitoring
				X	Implementation & mgmt
					Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
9604200	Colville Confederated Tribes to carry out Okanogan Watershed Planning and to implement habitat restoration	
9604000	Restore and Enhance Anadromous Fish Habitat in Salmon Creek	

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
N/A	This is a new project	

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Survey project site	a	Complete a Rosgen Type habitat survey.
2	Develop a restoration plan	a	Develop designs for instream and riparian restoration sites.
		b	Comply with ESA, NEPA, SHIPO, county and state agencies.
3	Install access crossing	a	Install bridge
4	Implement restoration plan	a	Install 3 miles of instream habitat.
		b	Re-establish 3 miles of riparian vegetation.
5	Develop and implement a monitoring plan	a	Develop monitoring plan
		b	Implement monitoring plan

Obj 1,2,3	Objective	Task a,b,c	Task
6	Develop and implement plans for an interpretive trail.	a	Install interpretive trail.
		b	Install interpretive signs.

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measurable biological objective(s)	Milestone	FY2000 Cost %
1	10/1999	12/1999	Survey Project Site	yes	2.98
2	12/1999	02/2000	Develop a Restoration Plan	yes	9.80
3	07/2000	09/2000	Install Crossing	yes	83.90
4	07/2001	11/2004	Implement Restoration Plan	yes	
5	11/2000	on going	Implement monitoring Plan	yes	3.32
6	11/2004	9/2005	Develop and implement plans for an interpretive trail	yes	
				Total	100

Schedule constraints
It will be necessary that all instream work be completed during the work window established by the Washington State Department of Fish and Wildlife
Completion date
2005

Section 5. Budget

FY99 project budget (BPA obligated):	$n/a

FY2000 budget by line item

Item	Note	% of total	FY2000 ($)
Personnel	Cost Share		
Fringe benefits	Cost Share		
Supplies, materials, non-expendable property	Survey Equipment	0.24	1,420.00
Operations & maintenance			
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	Installation of a one lane bridge	71.29	430,000.00
NEPA costs	Cost Share		
Construction-related support	See capital acquisitions		
PIT tags	# of tags:		
Travel	Cost Share		
Indirect costs	Contract Administration	7.30	44,082.00
Subcontractor			
Other	Training	1.56	9,400.00
		TOTAL BPA REQUESTED BUDGET	484,902.00

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount ($)
USFWS	Personnel for Survey and Design	4.12	24,837.96
	Environmental Compliance	2.75	16,558.64
	Monitoring	3.32	20,000.00
NRCS	Personnel for Survey and Design	4.12	24,837.96
WDFW	Engineering for bridge crossing and permitting	5.30	32,000.00
		Total project cost (including BPA portion)	603,136.56

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	264,000	396,000	426,800	100,000

Section 6. References

Watershed?	Reference
	Allen, R.L. and T.K. Meekin. 1980. Columbia River sockeye salmon study 1971-1974. Washington Department of Fisheries, Olympia, Washington.
	Barber, W.E. and N.R. Kevern. 1973. Ecological factors influencing macro invertebrate standing crop distribution. Hydrobiologia 43:53-75.
	Bjornn, T.C. and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. *In* Influences of Forest and Rangeland Management on Salmonid Fishes and their habitat, W.R. Meehan, editor. Special Publication 19. American Fisheries Society. Bethesda, Maryland.
X	British Columbia Ministry of the Environment. 1994. Water quality status report, Similkameen river. British Columbia ministry of the Environment, Penticton, British Columbia.
X	Bugart, B. and D. Bambrick. 1996. Draft Aquatic Species and habitat assessment of the Wenatchee, Entiat, Methow, and Okanogan watersheds for the mid-Columbia Habitat Conservation Plan. Wenatchee, Washington.
X	Champman, D. and four co-authors. 1994. Status of summer/fall chinook salmon in the mid-Columbia Region. Don Chapman Consultants, Inc. Boise, Idaho.
	Columbia Basin Fish and Wildlife Authority. 1998. FY 1999 Draft Annual Implementation Work Plan. Volume I. Submitted to the Northwest Power Planning Council.
X	Hagen, J.E. and G.B. Grette. 1994. 1993 Okanogan River sockeye salmon spawning ground population study. Parametrix report to Douglas County Public Utility District. East Wenatchee, Washington.
X	Hansen, J.M. 1997. Outmigration ecology of sockeye salmon *Oncorhynchus nerka* from Lake Osoyoos, Washington. Master's Thesis. Central Washington University, Ellensberg, Washington.
X	Hansen, J.M. 1993. Upper Okanogan River sockeye salmon spawning ground survey - 1992. For Douglas County Public Utility District. Colville Confederated Tribes, Fish and Wildlife Department, Nespelem, Washington.
X	Hillman, T. W. and K.E. Ross. 1992. Summer/fall chinook spawning ground surveys in the Methow and Okanogan River Basins. Don Chapman Consultants, Boise, Idaho.
	Hunter, H.J. 1991. Better Trout Habitat. A guide to stream restoration and management. Island Press, Washington D.C.
X	Kaumheimer, D.J. 1988. Similkameen River Instream Flow Study Okanogan County, Washington. Part 3: Habitat Versus Flow Relationships. U.S. Fish and Wildlife Service, Division of Ecological Services, Olympia, Washington. 91 pages.
	Meehan, W.R., F.J. Swanson, and J.R. Sedell. 1977. Influences of riparian vegetation on aquatic ecosystems with particular references to salmonid fishes and their food supply. Symposium on the Importance, Preservation and Management of the Riparian Habitat. Tucson, Arizona.

X	Mullan, J. 1986. Determinants of sockeye salmon abundance in the Columbia River, 1880's-1982; a review and synthesis. Biological Report 86(12). U.S. Fish and Wildlife Service. Leavenworth, Washington.
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X	Northwest Hydraulic Consultants, Inc. 1986. Appraisal of potential changes in river regime due to Similkameen Multipurpose Project. Report No. 2096/4223A. Prepares for U.S. Army Corps of Engineers. Seattle, Washington.
X	Okanogan Stakeholder's Advisory Committee. 1997. Draft Okanogan Watershed Management Plan. Okanogan, Washington.
X	Pacific Northwest River Basins Commission. 1977. The Okanogan River Basin Level B study of the water and land related resources. Okanogan Conservation District. Okanogan, Washington.
	Platts, W.S. 1991. Livestock Grazing: In influences of Forest and Rangeland Management on Salmonid Fishes and their Habitat, W.R. Meehan, editor. Special Publication 19. American Fisheries Society. Bethesda, Maryland.
	Rabeni, C.F. and G.W. Minshall. 1977. Factors affecting microdistribution of stream benthic insects. Oikos 29:33-43.
	Reeves, G.H., F.H. Everest, and J.R. Seddell. 1993. Diversity of juvenile anadromous salmonid assemblages in basins in coastal Oregon, USA with different levels of timber harvest. Transactions of the American Fisheries Society.
	Rosgen, D. 1996. Applied River Morphology. Wetland Hydrology, Pagosa Springs, Colorado.
X	United States Department of Agriculture, Forest Service. 1995a. Toats Coulee Watershed analysis. Okanogan National Forest, Okanogan, Washington.
X	United States Department of Agriculture, Forest Service. 1995b. Goat Creek watershed analysis and interim late successional reserve assessment. Okanogan National Forest, Methow Valley Ranger District. Winthrop, Washington.
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	United States Department of the Interior, Bureau of Land Management. 1993. Riparian Area Management: Process for assessing proper functioning condition. Bureau of Land Management Service Center. Denver, Colorado. BLM/SC/ST-93/003+1737.
	Washington State Department of Ecology. 1998. Proposed 303(d) list for Impaired and Threatened Surface Waters Requiring Additional Pollution Controls. Olympia, Washington.
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PART II - NARRATIVE

Section 7. Abstract

The Driscoll Island instream and riparian habitat rehabilitation site is located on property owned by the Washington Department of Fish and Wildlife (WDFW) one mile south of Oroville, Washington. The

proposed project would start at the historical confluence of the Okanogan and Similkameen rivers. The total project site would encompass approximately 6 miles of shoreline and instream habitat.

The river channels surrounding Driscoll Island are extremely important for anadromous runs of summer chinook salmon (*Oncorhynchus tshawystcha*), sockeye salmon (*O. nerka*), and summer steelhead (*O. mykiss*), because they provide migration corridors, spawning areas, and rearing habitat.

The primary goals of this project are instream restoration and riparian rehabilitation along Driscoll Island, to improve spawning habitat for adult anadromous salmonids and to improve rearing and resting habitat for juveniles. Habitat improvements should result in increased production and survivability of juvenile salmonids. These improvements will also benefit a variety of wildlife species including migratory song bird, waterfowl, and several mammalian species.

To achieve these goals, a Rosgen type habitat survey will be conducted, a restoration plan will be developed and implemented. Restoration of the site will include the installation of a one-lane access bridge, the rehabilitation of 4 miles of instream habitat and the revegetation of 3 miles of riparian vegetation. The restoration project will be implemented over five years. The first year will entail the installation of an access bridge, a site survey and the development of a restoration plan. Years two through five will be comprised of the implementation of the restoration plan and the development of monitoring and interpretive education plans. Once construction is complete, an interpretive trail will be installed. Monitoring will be accomplished by installing permanent cross sections, photo monitoring points and stream surveys.

Section 8. Project description

a. Technical and/or scientific background

The Okanogan River Watershed (ORW) is in Okanogan County, Washington and British Columbia, Canada. The ORW, a sub-watershed of the Columbia River runs primarily north and south covering 8,200 square miles. Approximately 2,345 square miles of the total are found within the borders of the United States (Okanogan River Basin Watershed Plan 1997; ORBWP).
Basin elevations range from 8,242' above mean sea level (mls) at the summit of Tiffany Mountain to 779' above mls at Lake Pateros (upstream of Wells Dam). Steep rugged ridge lines are the dominate physiographic features on the eastern and western portions of the watershed.

The two principal rivers draining the Okanogan watershed include the Okanogan and Similkameen. The Similkameen River, the largest tributary to the Okanogan River, originates in the Washington Cascades, flows northward into British Columbia and then back into the United States near Nighthawk, Washington. The Similkameen has a drainage basin of approximately 3,600 square miles, with 80 percent of it in British Columbia. Kaumheimer (1988) reported that mean annual runoff from the basin is 1.6 million acre-feet with an average annual discharge of 2,300 cfs (measured at Nighthawk, Washington). The ORBWP (1997) reported a similar average annual discharge for years 1929-1995 (2,304 ft^3/s; cfs). Monthly discharge for years 1929 through 1979 ranged from 604 cfs in January to 9,169 cfs in June (Kaumheimer 1988).

The Okanogan River originates in British Columbia at Okanogan Lake and flows south to its confluence with the Columbia River near Bridgeport, Washington (Kaumheimer 1988). Zosel Dam at the outlet of Osoyoos Lake controls flows into the Okanogan River near Oroville, Washington. Kaumheimer (1988) reported that the Okanogan has an annual discharge of 2.1 million acre-feet (measured at Malott, Washington). Annual average discharge for the Okanogan at Malott, Washington for years 1959-1995 is 3,020 cfs (ORBWP 1997). Average flow for the Okanogan at the Oroville, Washington gauging station above the confluence of the Okanogan and Similkameen is 666 cfs (1943-1995; ORBWP 1997). Kaumheimer (1988) reported mean monthly discharges from 1,057 cfs in September to 10,106 cfs in June, measured at Malott.

The Driscoll Island instream and riparian habitat rehabilitation site is located on WDFW property one mile south of Oroville, Washington. The proposed project would start at the historic confluence of the Okanogan and

Similkameen rivers and extend upstream along all shorelines of Driscoll Island (west and east shorelines). The total project site would encompass approximately 6 miles of shoreline and instream habitat.

The river channels surrounding Driscoll Island are extremely important for anadromous runs of summer chinook salmon (*Oncorhynchus tshawystcha*), sockeye salmon (*O. nerka*), and summer steelhead (*O. mykiss*), because they provide migration corridors, spawning areas, and rearing habitat. Spring chinook salmon have been extirpated from the Okanogan River Basin.

Adult summer chinook salmon enter the Okanogan River from July through late September, with peak spawning occurring in mid-October (Bugart and Bambrick 1996). Spatial distribution of spawners in the watershed is discontinuous (Bugart and Bambrick 1996). Spawning areas are limited between Zosel Dam and the town of Malott, Washington (Bugart and Bambrick 1996). In 1998, Andrew Murdoch from WDFW reported that 88 redds were found in the Okanogan River. A total of 11 redds were found upstream of the Highway 97 bridge to Zosel Dam located at the outlet of Lake Osoyoos. No redds were found on the east side of Driscoll Island.

The number of summer chinook redds in the Okanogan River (Tonasket Bridge to Zosel Dam) has ranged from a high of 90 in 1994 to 11 in 1992 (A. Murdoch, WDFW, Personal Communication - 1998). Hillman and Ross (1992) also reported that spawning occurs downstream of Enloe Dam on the Similkameen River to Driscoll Island. A. Murdoch (Personal Communication; WDFW; 1998) reported that 276 summer chinook redds were found in the Similkameen River during 1998. He further reported that 96.7% (267) of the redds were found between the Oroville Bridge downstream to the upstream end of Driscoll Island. Only two redds were found on the west side of Driscoll Island (A. Murdoch, Personal Communication, WDFW 1998). A. Murdoch (Personal Communication, WDFW 1998) also reported that the number of summer chinook redds in the Similkameen has ranged from a high of 777 in 1994 to 57 in 1992.

Bugart and Bambrick (1996) reported that juvenile summer chinook emerge from the gravel between January through April, and may rear from a few months to a year before migrating downstream. They further reported that most juveniles generally emigrate to the ocean as subyearling fry, leaving the Okanogan River from one to four months after emerging from the gravel.

Upper Columbia River summer chinook populations in the Okanogan River are considered depressed (WDFW 1992; SASSI). This classification is based on a short-term severe decline in escapement. At this time, summer chinook in the Okanogan River are not listed under the Endangered Species Act (ESA), because they are not considered a distinct species or Evolutionarily Significant Unit (ESU). In 1995, the National Marine Fisheries Service (NMFS) concluded that summer chinook were a part of a larger ESU. This ESU included all late-run summer and fall chinook salmon from the mainstem Columbia River and its tributaries.
The sockeye salmon run to the Okanogan Basin is highly variable (Bugart and Bambrick 1996). Escapement has ranged from a low of 1,661 in 1994 to a high of 127,857 in 1966. The average run size is reported at 36,000. Spawning generally occurs from early October through early November, with peak spawning occurring in mid-October (Hansen 1993). Hagen and Grette (1994) reported that sockeye spawn in the mainstem Okanogan River upstream of Lake Osoyoos, between Lyons Park and McIntyre Dam. Sheppard (*in* Hansen 1997) reported that juveniles emerge from the gravel in April and emigrate downstream to Lake Osoyoos where they rear for 1 to 3 years. Hansen (1997) reported that most of the fish emigrate to the Pacific Ocean each spring as yearlings.

Bugart and Bambrick (1996) suggested that sockeye salmon in the Okanogan Basin exhibited four life history strategies, one of which spawns in the lower Similkameen River. Only sockeye from one of the life history strategies proposed by Bugart and Bambrick (1996) are preforming well. This includes sockeye that spawn in the Okanogan River downstream of McIntyre Dam, rear to subyearlings in Lake Osoyoos and then outmigrate in the spring. The other three life history strategies are either extinct, not currently present, or not preforming well. Sockeye that spawn in the lower Similkameen River adjacent to the proposed Driscoll Island project site are classified as not performing well (Bugart and Bambrick 1996). Like other salmon stocks, this life history strategy has been affected by hydroelectric facilities on the Columbia River, land use practices, water allocations, and water quality degradation.

Upper Columbia River summer steelhead are listed as endangered under ESA. Historic and current records for steelhead in the Okanogan Watershed are incomplete. It is thought that Salmon Creek, Omak Creek, and the Similkameen River had small runs of steelhead, but are not used now because of passage barriers (Bugart and

Bambrick 1996). A site visit on November 4, 1998 indicated that suitable spawning gravels are available, and if adult steelhead were present, spawning could occur. SASSI (1992) lists the Okanogan River steelhead as depressed based on chronically low spawner escapement.

Other fishes endemic to the Okanogan Watershed include bull trout (*Salvelinus confluentus*), westslope cutthroat trout (*O. clarkii)*, rainbow trout (*O. mykiss*), mountain whitefish (*Prosopium williamsoni*), burbot (*Lota lota*), speckled dace (*Rhinichthys osculus*), northern pike minnow (*Ptychocheilus oregonensis*), sculpins (*Cottus* spp.), several species of Catostomids and Cyprinids, river lamprey (*Lampetra ayresi)*, and Western brook lamprey (*L. richardsoni*). Many exotic introduced fishes are also be found in the Okanogan River Basin; this includes several Centrarchids, Percids, Ictalurids, and Cyprinids.

The status of bull trout and cutthroat trout in the Okanogan Watershed is unknown. Bugart and Bambrick (1996) reported that U.S. Forest Service personnel surveyed the Toats Coulee sub-watershed in 1994, but did not find any bull trout or cutthroat trout (U.S. Forest Service 1995a; USFS). The USFS (1995a) reports that historic records suggest that cutthroat were present in the Middle Fork of Toats Coulee. Bull trout are listed as threatened under the ESA by the USFWS (63 FR 31647).

Quantitative site specific stream survey information for the proposed Driscoll Island project site is not available. However, Bugart and Bambrick (1996) reported that lack of overhead coverage, woody debris recruitment, invertebrate drift, undercut banks, streambank stability, and a myriad of other problems are common in the Okanogan River. Information describing the existing resource conditions of the Okanogan and Similkameen rivers are discussed below.

Riparian Habitat: Chapman et al. (1994) reported that riparian habitat in the Okanogan Watershed is the most degraded of the four watersheds (Entiat, Methow, Wenatchee, and Okanogan). The National Resources Conservation Service (NRCS) estimated that about 14,600 meters of river bank in a 21 mile reach (between Oroville and Tonasket, Washington) requires woody vegetation to stabilize erosive stream banks (Bugart and Bambrick 1996). The NRCS also identified 23 sites totaling 5,900 meters that they classified as highly erosive requiring rock toes and/or root wad revetments and bank re-sloping. Approximately 20% of the shoreline in this 21 mile section will require vegetation plantings to stabilize stream banks and improve water quality. The absence of riparian vegetation contributes to the two major factors limiting salmonid production in the Okanogan and Similkameen; high water temperatures and sedimentation (Bugart and Bambrick 1996).

Temperature: Water temperature poses the most pressing problem for increasing survival of chinook salmon, sockeye salmon, and steelhead in the Okanogan and Similkameen rivers (Bugart and Bambrick 1996). Bjornn and Reiser (1991) reported that water temperatures between 23-29^{o}C were lethal to salmonids depending on species and acclimation temperature. Data plotted by Chapman et al. (1994) and Hansen (1993) indicates the mean daily temperature in the Okanogan River approaches and exceeds the lethal tolerance level for salmonids. For example, mean daily temperature in the Okanogan River for years 1986 and 1987 was well over 21^{o}C (Chapman et al. 1994). Similar findings by Hansen (1993) near Zosel Dam in 1992, documented the mean daily temperature was 21^{o}C or higher for at least 50 days, and greater than 25^{o}C for periods of up to 10 days. Chapman et al. (1994) also reported temperatures in the Similkameen up to 22^{o}C during the summer. Currently, both the Okanogan and Similkameen rivers are listed on the proposed 1998 Section 303 (d) list as having many temperature excursions beyond the accepted criterion (Washington State Department of Ecology 1998; DOE).

Sedimentation/Stream Bank Stability: The predominant soils suffering the most severe erosion along the Okanogan River are the Colville silt loams and Bosel fine sandy loams (NRCS 1994). These soils are highly suspectable to flood events and easily eroded once disturbed (USDA Soil Conservation Service 1980). The NRCS has estimated that about 92,000 tons of soil are lost each year in a 21 mile section of the Okanogan River between Oroville and Tonasket, Washington (Bugart and Bambrick 1996; NRCS 1994). In addition, the NRCS (1994) estimated that 8.5% of the total bank surveyed (same 21 mile section) was actively eroding and needed treatment (revegetation or bio-engineering) to prevent large scale erosion and to allow for vegetation to become established. Similar conditions in the Similkameen Watershed exist. For example, the Pacific Northwest River Basin Commission (1977; PNRBC) and Northwest Hydraulic Consultants, Inc. (1986) reported that soils in the Similkameen have a high potential for accelerated mass or surface erosion. As a result, spawning habitat in the accessible reach of the Similkameen River below Enloe Dam is degraded.

The increase in sediment can have adverse effects on fish and other aquatic biota. Meehan et al. (1977) reported that suspended sediment may accumulate on gill filaments and inhibit their ability to function properly. Increased bedload can also limit spawning areas, which Bugart and Bambrick (1996) have reported for the mainstem Okanogan River. Increases in mortality rates of incubating eggs can also occur (Meehan et al. 1977). Bjornn and Reiser (1991) reported that mortality rates for steelhead and rainbow trout reached 50% when fine sediment levels reach 30-40%. Aquatic insect density, biomass, and standing crops are also affected when increases in fine sediments or changes in bottom substrates occur (Barber and Kevern 1973); Rabeni and Minshall 1977).

Water Quality: As mentioned above, water temperature often exceeds the lethal tolerance levels for salmonids in the Okanogan and Similkameen rivers. Bugart and Bambrick (1996) reported that this exceedence is partly a result of low gradient and solar radiation on the upstream lakes, but is exacerbated by sedimentation and low summer flows caused by dam operations and irrigation.

The Okanogan River has been included on the Washington State Department of Ecology's Section 303 (d) list for violations of temperature, dissolved oxygen, pH, DDE, DDD, and PCB standards (DOE 1996; DOE 1998). In addition, fecal coliform bacteria and total bacteria have also exceeded state and federal water quality criteria (Bugart and Bambrick 1996). In 1977, the Pacific Northwest River Basins Commissions (PNRBC 1977) reported that fecal coliform, nitrate/nitrite, and total phosphorous levels seemed higher at upstream sites. The PNRBC (1977) attributed these problems to various agricultural practices (flow returns from irrigation), livestock impacts, and forest practices.

Bugart and Bambrick (1996) reported that water quality in the Similkameen River in Canada is considered good, according to levels established by the British Columbia Ministry of the Environment (BCE). Bugart and Bambrick (1996) did however report that coliform in the river, molybdenum in a tributary, and phosphorus in some area lakes may periodically exceed acceptable levels. In a BCE report (1994), fecal coliform objectives were not met in the mainstem Similkameen. The Similkameen has also been included on the list for violations of temperature and pH (Bugart and Bambrick 1996).

Large Woody Debris: Large woody debris (LWD) is a critical element in creating and maintaining instream habitat complexity for juvenile salmonids (USDI Bureau of Land Management 1993; BLM). Large woody debris not only creates high quality pools and riffles, but provides gradient control, and stream channel stability (Platts 1991). LWD also serves to stabilize sinuous streams and can dissipate stream energy associated with high flows resulting in less erosion to the stream banks (Hunter 1991). LWD in the Okanogan and Similkameen rivers is severely lacking and does not meet NMFS criteria of having greater than 20 pieces of LWD per mile at least 12" in diameter and 35' in length (NMFS 1996a). An adequate source of woody debris recruitment is also lacking in the riparian corridor.

Pools/Side Channels: Pools are important rearing and resting habitat for juvenile and adult salmonids. Deep or primary pools provide thermal refuge during low flow periods (Reeves et al. 1991). They help slow velocity, dissipate energy, and provide slow water areas for juvenile fishes during high flow events. Based on site visits, pool frequency in the Okanogan and Similkameen rivers do not meet the criteria established by the NMFS (NMFS 1996a). Side channels or off-channel areas are important in providing over wintering habitat, refuge during high flow periods, and rearing areas for juvenile salmonids. During the November 4, 1998 site visit, very few side channels were found in the proposed Driscoll Island project area.

Indigenous anadromous fish (spring and summer chinook salmon, sockeye salmon, and summer steelhead) in the Okanogan River Sub-basin have been actively targeted for management (Columbia Basin Fish and Wildlife Authority 1998; CBFWA). The management goal is to restore sustainable, naturally producing populations to support tribal and non-tribal harvest and cultural and economic practices, while protecting the biological integrity and the genetic diversity of the watershed. To achieve this goal high quality habitat is essential for the recovery of anadromous salmonids in the Columbia River Basin.

To accomplish the goal of the Driscoll Island project, an interdisciplinary team (IDT) comprised of the following people will design and implement the restoration project: Kate Terrell, Fish and Wildlife Biologist (USFWS), Tom Dresser, Fish and Wildlife Biologist (USFWS), Bill Stewart, Fish and Wildlife Biologist (USFWS), Dale Swedberg, Wildlife Biologist, Area Wildlife Manager (WDFW), Bill Stewart, Fish and Wildlife Biologist (USFWS), Joe Lange, Engineer (NRCS), and Barry Sutherland, Fluvial Geomorphologist (NRCS). The IDT will survey and evaluate the project area in ***Phase I - (FY 2000)***. This will be a Rosgen style survey analyzing bed load, stream type, geomorphology, channel condition, instream habitat, riparian vegetation, and overall watershed condition. Utilizing all of the available information, a restoration plan will be developed. In addition to the survey and restoration plan, a crossing will be installed over the Okanogan River for better access to the site. Once completed, the project will be implemented during ***Phases II-V - (FY 2001-2005)***.

Construction of a bridge to Driscoll Island is a necessary first step in the proposed Driscoll Island Habitat Restoration and Rehabilitation Project (Project). The Project will take place over a minimum of five years with additional maintenance to occur over time. A project of this magnitude will require the transportation of rootwads, trees, and thousand of yards of heavy rock material for the construction of instream structures and streambank reconfiguration. Heavy equipment will also be necessary of the completion of the project. Dump trucks, loaded with rock, and heavy equipment will destroy the ford and increase the disturbance to fish species present during the crossing. Continual maintenance of the ford will not only be costly, it will degrade the existing habitat downstream of the area. Currently the island is inaccessible during higher flows which occurs from mid-April through July. Therefore a bridge would allow year round access for the restoration activities as well as other uses. These include environmental resource education, recreation including hunting and fishing, operation and maintenance of a cottonwood nursery (to be used for revegetation), farming crops, livestock management, and fish and wildlife management activities.

b. Rationale and significance to Regional Programs

Upper Columbia River steelhead are listed as endangered under the Endangered Species Act of 1973, as amended. Okanogan River summer steelhead population levels are below potential because of juvenile and adult mortality at hydroelectric facilities on the Columbia River, land use practices, and water allocations (SASSI 1992). Loss of habitat is recognized as a significant factor in decreasing salmonid population (NMFS 1996b; USFS 1995b).

SASSI (1992) classifies Upper Columbia River summer chinook as depressed for the Okanogan River. This classification is based on a short-term severe decline in escapement. Although escapement is depressed, summer chinook in the Okanogan River are not listed under the ESA at this time, because they are not considered a distinct species or ESU. In 1995, NMFS concluded that they were a part of a larger ESU. This ESU includes all late-run summer and fall chinook salmon from the mainstem Columbia River and its tributaries.

Sockeye population levels have fluctuated significantly over the last 60 years (Allen and Meekin 1980; Mullan 1986). For example, escapement has ranged from a low of 1,661 in 1994 to a high of 127,857 in 1966 (Bugart and Bambrick 1996). Sockeye that spawn in the lower Similkameen River adjacent to the proposed Driscoll Island project site are classified as not preforming well (Bugart and Bambrick 1996). Like other salmon stocks, sockeye salmon have been affected by hydroelectric facilities on the Columbia River, land use practices, water allocations, and water quality degradation.

Through the restoration of instream habitat and riparian vegetation in this reach of the Okanogan and Similkameen rivers, the migration corridor would be improved for chinook, sockeye, and steelhead. Instream structures will also provide rearing and resting areas for juvenile salmonids. More important, stream bank stabilization through reshaping and revegetation will decrease sedimentation loads to the watershed. Decreasing sediment inputs would ultimately result in better spawning gravels, increased embryo survival, and an increase in aquatic invertebrates.

The Driscoll Island instream and riparian restoration project will move towards the overall management goal for anadromous species in the Okanogan River Watershed, as defined by the CBFWA (1998). This goal is to restore sustainable, naturally producing populations to support tribal and non-tribal harvest and cultural and economic practices while protecting the biological integrity and the genetic diversity of the watershed. In addition, this project will benefit many other species in the area. This includes 21 reptiles and amphibians, 52 mammals, and 192 bird species including; waterfowl, shorebirds, gallinaceous birds, perching birds, raptors, hawks, and owls.

In addition to the biological benefits of the Driscoll Island project, this project will be used as a demonstration site to promote bio-engineering and habitat restoration. Results of this project will be presented at a number of workshops to educate local land owners on the benefits of restoration and how to work with the Endangered Species Act. In addition, this project will serve as an outdoor classroom for high school students in Oroville and Tonasket, Washington. This will provide students an opportunity for hands on experience in natural resources. The interpretive trail will also give the public an opportunity to view fish and wildlife in their natural environment.

c. Relationship to other projects.

The Driscoll Island project occurs in the same watershed as BPA project number 9604200, which funds the Colville Confederated Tribes to carry out Okanogan Watershed Planning and to implement habitat restoration. BPA project number 960400, Restore and enhance anadromous fish habitat in Salmon Creek is also located within the Okanogan watershed.

This proposed project is a cooperative effort between the U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, and the Natural Resources Conservation Service. All involved agencies (USFWS, WDFW, and NRCS) will work cooperatively to develop designs, restoration and monitoring plans, comply with permitting, NEPA and ESA, as well as oversee construction during restoration activities.

d. Project history (for on going projects)

This is a new project.

e. Proposal objectives

Main Goal: Instream restoration and riparian rehabilitation along the river channels of Driscoll Island (6 miles of shoreline). To improve spawning habitat for adult anadromous salmonids and to improve rearing and resting habitat for juveniles. Habitat improvements may result in increased production and survivability of juvenile salmonids. Improvements along the riparian buffer will also benefit wildlife species as well.

1. ***Phase I. - (FY 2000)***

a. Complete a survey of the project site and combine this with available information.

b. Develop a restoration plan for the project site.

c. Install a one-lane bridge across the Okanogan River to provide year-round public access to the site.

2. ***Phase II. And III - (FY 2001 - 2002)***

a. Submit applications and biological assessment for compliance with state, local, and federal permits.

b. Install instream structures along 2.5 miles of Driscoll Island.

c. Establish a monitoring program.

d. Revegetate riparian area.

3. ***Phase IV. - (FY 2003)***

a. Monitoring.

b. Install 1.5 miles of in-stream structures.

c. Revegetate 1.5 miles of riparian buffer along the east side of Driscoll Island.

d. Develop plans for an interpretive trail.

4. ***Phase V. - (FY 2004)***

a. Monitoring.

b. Install interpretive trail.

c. Install interpretive signs.

d. Workshops for local landowners and develop a curriculum for lessons on natural resources within the Okanogan watershed.

5. Phase VI. (On going)

1. Continue monitoring for a minimum of ten years

f. Methods.

Phase I. - (FY 2000)

1. Complete a survey of the project site and combine this with available information**.**
A Rosgen style survey will be conducted looking at geomorphic characteristics including the following parameters (Rosgen 1996).

a) Stream Description.
b) Valley Morphology.
c) Plan View Morphology.
d) Channel Sinuosity.
e) Channel Slope.
f) Bed Features.
g) Entrenchment Ratio.
h) Width/Depth Ratio.
i) Dominant Channel Materials.
j) Gradient.
k) Meander Width Ratio.

2. Once all the survey data has been collected, a restoration plan for the project site will be developed. This plan may include the following:

a. Introduction of large woody debris into the system.
b. Reestablishing channel meanders.
c. Establish a high pool/riffle ratio.
d. Establish a lower width/depth ratio.
e. Increase cover.
f. Increase stream stability.
g. Improve instream habitat for salmonids.
h. Improve riparian vegetation.

3. Designs will be developed to implement the restoration plan. These designs will be Rosgen style of bio-engineering. This will incorporate large woody debris, rock, rock reconfiguration, and vegetation.

4. Once the designs are complete, a coordination meeting will be held with the IDT, Okanogan Stake Holders, and other interested parties. The IDT is striving for a holistic approach to watershed restoration.

5. Install 148' bridge to be used for year-round access during construction . After the project is complete the bridge will be used for farm year-round access as well public access to the outdoor education area and the interpretive trail.

Phases II. and III. - (FY 2001 - 2002)

1. Biological assessment on permit applications will be submitted to the local, state, and federal agencies.

2. Install instream structures along 2.5 miles of Driscoll Island. Structures may include the following:

   a. Installation of root wad revetments.
   b. Installation of sunken habitat structures.
   c. Installation of rock veins.
   d. Re-slope stream banks.
   e. Reconfigure existing rip-rap.
   f. Establish planting benches.

3. Establish a monitoring plan. This will include the following parameters:

   a. Riparian vegetation.
   b. Deposition pattern.
   c. Debris occurrence.
   d. Meander pattern.
   e. Sediment supply.
   f. Bed stability.
   g. Width/Depth ratio.

4. Reestablish riparian vegetation. This will be accomplished by planting bare root stocks of black cottonwood (*Populus trichocarpa*), quaking aspen (*P. tremuloides*), willow (*Salix spp*.), red-osier dogwood (*Cornus stonnifera*), snow berry (*Symphoricarpos oreophilus*), service berry (*Amelanchier alnifolia*), and wild rose (*Rosa spp*.). All disturbed areas will be reseeded using native streambank grasses.

Phase IV. - (FY 2003)

1. Monitor instream structures, riparian vegetation, and stream condition based on the monitoring program developed during ***Phases II and III.*** See above list for parameters that will be monitored.

2. Install instream structures along 1.5 miles of Driscoll Island. Structures may include the following:

   a. Installation of root wad revetments.
   b. Installation of sunken habitat structures.
   c. Installation of rock veins.
   d. Re-slope stream banks.
   e. Reconfigure existing rip-rap.
   f. Establish planting benches.

3. Revegetate 1.5 miles of riparian buffer along the east side of Driscoll Island. Native vegetation will include the following:

   a. Black Cottonwood
   b. Quaking Aspen
   c. Willow
   d. Red-osier Dogwood
   e. Snow Berry
   f. Service Berry
   g. Wild Rose

4. Develop plans for an interpretive trail.

Phase V. - (FY 2004)

1. Continue to monitor instream structures, riparian vegetation, and stream conditions based on the monitoring program developed during ***Phase II and III***.

2. Construct interpretive trial. This will allow for on-site visits to demonstrate bio-engineering and habitat restoration.

3. Install interpretive signs illustrating habitat restoration, and fish and wildlife enhancement.

4. Develop a slide presentation for educational presentation.

g. Facilities and equipment

The U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, and the Natural Resource Conservation Service will supply all the necessary materials to perform the surveys and develop the restoration and monitoring plans. This proposal is a request for on the ground restoration materials, equipment and training needed for installation of the project. A contractor will be hired to supply a walking excavator, dump trucks, trackhoe, bull dozer, rock drill, and other equipment necessary for construction of the structures. The IDT will work with the contractor to obtain all materials necessary for the project.

h. Budget

Item	USFWS	NRCS	WFDW	BPA
Personnel and Benefits				
1. Survey	8,279.32	8,279.32		
2. Design	16,588.64	16,588.64		
3. NEPA and BA's	16,558.64			
4. Monitoring	20,000.00			
Training				
1. 4 people to Rosgen: Applied Fluvial Geomorphology				9,400.00
Engineering and Permitting				
1. Bridge and Crossing			30,000.00	
2. Permitting			2,000.00	
Bridge Installation				430,000.00
Survey Equipment				
1. 2 Laser Range Finders				560.00
2. 2 Camlines				360.00
3. 2 pair of Silvey Pins				300.00
4. Camera				200.00
Contract Administration				
1. Administration of the BPA portion of the grant				44,082.00
Totals	61,426.60	24,867.96	32,000.00	484,902.00

U.S. Fish and Wildlife **= $ 61,426.60** *(10.18 %of the total project)*
Natural Resource Conservation District **= $ 24,867.96** *(4.12 % of the total project)*
Washington Department of Fish and Wildlife **= $ 32,000.00** *(5.30 % of the total project)*
Bonneville Power Administration **= $484,902.00** *(80.40 % of the total project)*

SECTION 9: Key Personnel:

Kate Terrell is a fish and wildlife biologist with the U. S. Fish and Wildlife Service in Moses Lake, Washington. She joined the U. S. Fish and Wildlife Service in 1992. Prior to working for the USFWS, she worked for the Oregon Department of Fish and Wildlife and the U. S. Forest Service. Her work currently focuses on habitat restoration in anadromous systems. Currently, she is working with private land owners, local groups and other agencies in the Chewuch, Entiat, Wenatchee, Okanogan and Methow Rivers as well as Swale, Rattlesnake and Chumstick creeks. This work focuses on the development and implementation of restoration plans.

Tom Dresser is a fish and wildlife biologist with the U.S. Fish and Wildlife Service in Moses Lake, Washington. He received an associate degree in wildlife management from North Dakota State University - Bottineau, bachelor's degrees from the University of Idaho (both fish and wildlife), and a master degree in fisheries from the University of Idaho. Tom joined the U.S. Fish and Wildlife Service in 1998. Prior to joining the USFWS, he worked for the U.S. Army Corps of Engineers, Arizona Game and Fish Department, and University of Idaho. His current work focuses on habitat restoration in anadromous systems and FERC relicensing.

Joseph Lange, P.E. is an engineer for the Natural Resource Conservation Service in Wenatchee, Washington. He received his bachelors degree of engineering from Washington State University in Pullman, Washington in 1987. Since graduation he has worked for the NRCS, where he has focused on designing bio-engineered projects on river systems in the state of Washington. Currently, he is working on habitat restoration projects in eastern Washington.

W. Barry Southerland is a fluvial geomorphologist with the Natural Resource Conservation Service. Barry is well schooled in Rosgen and Leopold techniques. He has been involved in restoration work for the past 15 years. During the summer of 1997, he designed and implement a meander reconstruction project on Asotin Creek in eastern Washington. This project is very similar to the proposed Goat Creek Restoration.

Bill Stewart is a fish and wildlife biologist with the U. S. Fish and Wildlife Service in Moses Lake, Washington. He received his bachelor's degree in environmental and forest biology from the State University of New York College of Environmental Science and Forestry, and a master's degree from Washington State University.

Dale Swedberg is a the Wildlife Area Manager for the Sinlahekin Wildlife Area which includes Driscoll Island. He has work for the Washington Department of Fish and Wildlife for more than twenty years. Currently, he oversee a large area including Driscoll Island. These areas are managed for a variety of species including: salmon, steelhead, resident fish, waterfowl and large game.

Section 10. Information/technology transfer

Results from this project will be presented at workshops throughout eastern Washington. The focus of these workshops will be the private land owner. This project will be used as a demonstration site to teach landowners about the benefits of habitat restoration and working with the Endangered Species Act. In addition to the workshops, an interpretive trail will be developed to encourage local schools to use the site as an outdoor classroom to teach students about natural resources management. This will include aquatic, riparian, and up-land habitats. The site will also be open to the general public for recreational and educational purposes.